
Cell elongation is an adaptive response for clearing long chromatid arms from the cleavage plane.

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Public Summary:

Chromosome segregation must be coordinated with cell cleavage to ensure correct transmission of the genome to daughter cells. Here we identify a novel mechanism by which *Drosophila melanogaster* neuronal stem cells coordinate sister chromatid segregation with cleavage furrow ingression. Cells adapted to a dramatic increase in chromatid arm length by transiently elongating during anaphase/telophase. The degree of cell elongation correlated with the length of the trailing chromatid arms and was concomitant with a slight increase in spindle length and an enlargement of the zone of cortical myosin distribution. Rho guanine-nucleotide exchange factor (Pebble)-depleted cells failed to elongate during segregation of long chromatids. As a result, Pebble-depleted adult flies exhibited morphological defects likely caused by cell death during development. These studies reveal a novel pathway linking trailing chromatid arms and cortical myosin that ensures the clearance of chromatids from the cleavage plane at the appropriate time during cytokinesis, thus preserving genome integrity.

Scientific Abstract:

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